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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/497,320	02/03/2000	Ahmad Ghaemmaghani	E0545/1516P	7350

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EXAMINER

DIAZ, JOSE R

ART UNIT PAPER NUMBER

2815

DATE MAILED: 11/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/497,320

Applicant(s)

GHAEMMAGHAMI ET AL.

Examiner

José R Díaz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4,5,7,8,11,12 and 14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4,5,7,8,11,12 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. In view of the appeal brief filed on August 11, 2003, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 4-5, 8, and 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori et al. (US Pat. No. 5,320,974) in view of Wolf et al. ("Silicon Processing for the VLSI Era, Volume 1-Process Technology", Lattice Press, 1986, pp. 321-324), previously cited in the Office action mailed on May 6, 2003.

Regarding claims 1 and 8, Hori et al. teach a method for providing a halo implant in a semiconductor device comprising the steps of: providing a thin mask layer (MASK) to the semiconductor device (N + POLY-Si GATE) (see figs. 3-4) that covers a substantial amount of an active area (DRAIN REGION) (see figs. 3-4. Also, please note that figs. 3-4 show only a portion of the device of the example disclosed in figs. 1C and 2A-2C, in which the mask (8a) is also provided over the source region (7a)) comprising a source region (7a) (figs. 1C and 2A-2C) and a drain (DRAIN REGION) region of the semiconductor device (N + POLY-Si GATE) (see figs. 3-4); and providing the halo implant (B+) (see figs. 1C, 2A-2C, and 3).

However, Hori et al. fails to teach thin mask comprising photoresist. Wolf et al. teaches that photoresist is a conventional alternative implantation mask material used in the art (see last paragraph of page 321 of Wolf et al.).

Hori et al. and Wolf et al. are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to use photoresist instead of a metal or an

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oxide film as the ion implantation mask material. The motivation for doing so, as is taught by Wolf et al., is that photoresist have good ion stopping power in the smallest thickness (see last paragraph of page 321 of Wolf et al.). Therefore, it would have been obvious to combine Wolf et al. with Hori et al. to obtain the invention of claims 1, 4, 5, 8, 11 and 12.

Regarding claims 4 and 11, Hori et al. teach that a halo implant angle of about 45° (see col. 6, lines 60-63).

Regarding claims 5 and 12, Hori et al. teach providing LDD regions (6a and 6b) (see Figs. 1A and 2C) before the halo implant (B+) (see figs. 1C).

5. Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori et al. (US Pat. No. 5,320,974) in view of Wolf et al. ("Silicon Processing for the VLSI Era, Volume 1-Process Technology", Lattice Press, 1986, pp. 321-324), and further in view of Thackeray et al. (US Pat. No. 6,037,107).

Regarding claims 7 and 14, a further difference between the prior art and the claimed invention is the use of DUV. Thackeray et al. teaches that it is well known in the art to expose the photoresist mask to deep ultraviolet (DUV) radiation (see col. 1, lines 35-38).

Hori et al., Wolf et al. and Thackeray et al. are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to expose the photoresist mask to deep ultraviolet (DUV) radiation. The motivation for further doing so,

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as is taught by Thackeray et al., is that DUV exposure provides patterns of reduced feature size (see col. 1, lines 35-38). Therefore, it would have been obvious to further combine Thackeray et al. with Hori et al. and Wolf et al. to obtain the invention of claims 7 and 14.

Response to Arguments

6. Applicant's arguments with respect to claims 1, 4-5, 7-8, 11-12, and 14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fulford et al. (US Pat. No. 6,114,211) teaches a vertical halo region (see abstract).

Correspondence

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R Díaz whose telephone number is (703) 308-6078. The examiner can normally be reached on 9:00-5:00 Monday, Tuesday, Thursday and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JRD

A handwritten signature in cursive script that reads "Tom Thomas".

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800